STREAM WALK TEST - FISH AND WILDLIFE ASSESSMENT

The number and variety of fish and other wildlife, or the lack thereof, can provide important clues to the health of the stream. Fish that are gasping for air at the surface may be suffering from low dissolved oxygen contents in the water. Diseased fish or fish that are swimming erratically may indicate the presence of toxic substances at levels not great enough to kill them outright. The absence of fish is a strong indicator of a badly distressed stream. Other wildlife such as raccoons, aquatic birds, bullfrogs, etc., are attracted to streams with healthy fish populations.

MATERIALS:

- Pencils
- Worksheet - Fish and Wildlife Assessment
- Worksheet - Animal Tracks
- Binoculars (optional)
- Dip nets

PROCEDURE:

- Do this activity downstream from the others.
- Sit quietly, listen for different animal sounds and observe the surroundings for wildlife (binoculars optional).
- Frogs can be found in the grass near the streambank, turtles can be observed on logs or exposed banks, salamanders may be found under logs or rocks (do not stick hands under rocks or logs), birds may be seen feeding in the water or perched on tree limbs.
- Look for animal tracks in the mud.
- Use dip nets to catch fish or other aquatic animals.
- Record findings on Worksheet - Fish and Wildlife Assessment.

EVALUATION:

- How many different types of wildlife were seen?
- Was there any evidence of wildlife around the water? (tracks, etc.)
- What conclusions about the condition of the stream can be made from this test?

(adapted from Cole and Pauley, 1993; Nelson)

WORKSHEET - FISH AND WILDLIFE ASSESSMENT

Record observations made at site on the form below:

Collectors' names _____

Date and time _____

River basin _____

County _____

Stream/river/lake name _____

Site location _____

Types of fish observed: indicate whether their numbers were abundant, sparse, or no fish observed:

_____

_____

Other animals, or evidence such as tracks, bird songs, etc. observed - indicate number and type:

Amphibians _____

_____

Reptiles _____

_____

Birds _____

_____

Ducks _____

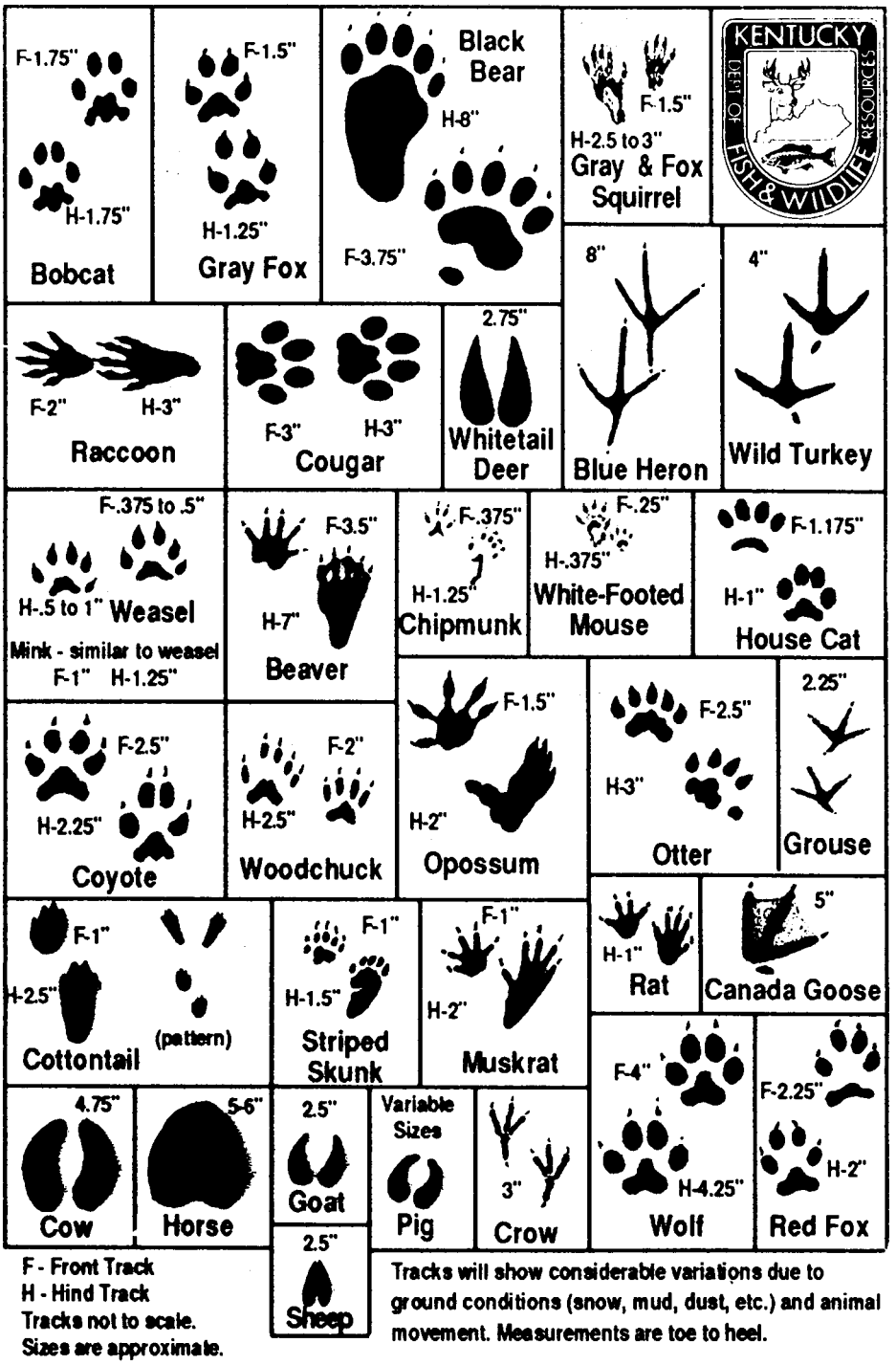
_____

Mammals _____

_____

(adapted from Cole and Pauley, 1993; Nelson)

WORKSHEET - ANIMAL TRACKS



F - Front Track
H - Hind Track
Tracks not to scale.
Sizes are approximate.

Tracks will show considerable variations due to ground conditions (snow, mud, dust, etc.) and animal movement. Measurements are toe to heel.

DIG IN AND ROOT FOR A RICH ENVIRONMENT

GRADES: 6-A*
SUBJECT: Geography, Science
SKILLS: Analyzing, applying, discussing, evaluating, mapping, observing, problem solving, service-learning
DURATION: Several class periods
SETTING: Outdoors, suitable for use in outdoor classroom
KERA ACADEMIC EXPECTATIONS: 1.3, 2.1, 2.2, 2.3, 2.19, 3.6, 5.1, 5.2, 5.4, 5.5, 6.1, 6.2, 6.3

OBJECTIVE:
To apply methods of soil conservation in community.

METHOD:
Identify problem erosion areas on school grounds, or other area, and install soil conservation measures.

MATERIALS NEEDED:

- Worksheet - Soil Erosion Inventory
- Pencils

PROCEDURE:

- Conduct at least one of the activities in both the Soil and Siltation sections.
- Select a site(s) for evaluation.
- Visit site(s) and fill out worksheet from observations.
- Make a map showing the site(s) and problem areas.
- Brainstorm for ideas to correct the problems.
- Invite someone from the local Natural Resource and Conservation (Soil Conservation) Office or a biologist from Fish and Wildlife to visit site(s), review findings, and suggest soil conservation measures. These representatives may also have reimbursement funds available.
- Create and carry out a plan to correct the erosion problems by installing selected soil conservation measures.

EVALUATION:
This activity applies best management practices for soil conservation and the prevention of siltation in nearby waterways.

- Where does the erosion occur?
- How could this erosion have been prevented?
- How can this problem be corrected?

* For Grades K-5, look for areas of erosion, discuss how this erosion started, and what could have been done to prevent it.

(adapted from Natural Resources and Environmental Protection Cabinet, 1991)

WORKSHEET - SOIL EROSION INVENTORY

Answer the questions below from observations at the site:

	YES	NO
1. Does the area have lots of grass, shrubs, and/or shade trees?		
2. Do the plants look strong and healthy?		
3. Is there a layer of protective dead and decaying leaves, twigs, and other vegetation over the ground?		
4. Does the area have plants that are reseeding and sprouts that are growing into young plants?		
5. Does the ground feel soft and springy or spongy when you walk on it?		
6. Are the ditches along the sidewalks, driveways, streets, and roads devoid of vegetation?		
7. Have gullies or erosion channels been cut into the slopes?		
8. Are there any stream banks that are washing away?		
9. During a rain, is the runoff muddy?		
10. Can you find evidence of flooding (garbage or vegetation hanging from the trees)?		

The site is in good condition if the answers to questions 1-5 are YES, and the answers to questions 6-10 are NO.
If not, there are problems that need to be corrected.

(adapted from Natural Resources and Environmental Protection Cabinet, 1991)

COMMUNITY CLEANUP CAMPAIGN

GRADES: 9-A*
SUBJECT: Art, Health, Language Arts, Social Studies
SKILLS: Analyzing, application, communication, media, problem solving, public speaking, reporting, service-learning, small group work, writing
DURATION: Several months for planning, one day for cleanup
SETTING: Indoors and outdoors
KERA ACADEMIC EXPECTATIONS: 1.1, 1.2, 1.3, 1.11, 1.12, 1.13, 2.18, 2.33, 3.6, 4.2, 5.1, 5.3, 5.4, 6.1, 6.2, 6.3

OBJECTIVE: To implement an environmental improvement program.

METHOD: Conduct a community cleanup campaign.

MATERIALS NEEDED:

- Checklist for a Successful Cleanup Campaign
- Posterboard and art supplies
- Trash bags
- Shovels
- Rakes
- Gloves
- Refreshments

PROCEDURE:

- Select a site(s) for cleanup - get permission from landowner. Select a date and rain date.
- Follow Checklist for a Successful Cleanup Campaign.
- Keep a notebook of this year's plans to facilitate next year's planning.
- Contact local officials for trash pick-up by sanitation truck; permission to use municipal waste disposal facilities if sanitation dept. not making pick-up (ask that any fees be waived); police assistance with traffic, and junk car removal; and special pick-up for large or heavy items.
- Coordinate volunteers by making a grid map of area, determining size of crew needed per section, appointing crew chiefs, arranging special transportation needs (boats, etc.), making crew schedules, locating trash drop off points, and providing refreshments.
- Ask businesses and industries for donations of trucks, trash or litterbags, refreshments, transportation (make sure to publicize their efforts).
- PUBLICIZE!!!!
- Reward volunteers with T-shirts, buttons, decals, magnets, etc.
- Send certificate of appreciation to participating businesses, organizations, government officials, etc., along with a written thank-you note.

EVALUATION:
This activity encourages environmental improvement through community involvement.

- Did the clean up go as planned?
- What could be done differently next time to make it run smoother?

* For Grades K-8 participate in a cleanup.

[adapted from Cole and Pauley, 1993; Kentucky Division of Water (a)]

CHECKLIST FOR A SUCCESSFUL CLEANUP CAMPAIGN

TASK	PERSON IN CHARGE	BEGINNING DATE	FINISHED
SIX TO TWELVE MONTHS			
Select site			
Select date			
Confirm permission			
Make organization list			
Recruit staff			
Select registration site			
Mail recruitment letters			
THREE TO SIX MONTHS			
Make posters			
Make brochures			
Plan publicity			
Contact media			
Contact photographer			
Make a budget			
Raise money			
Solicit in-kind donations			
Plan refreshments			
Order trash bags and litter bags			
Invite VIPs			
Prepare registration forms			

TASK	PERSON IN CHARGE	BEGINNING DATE	FINISHED
ONE TO THREE MONTHS			
Send press releases			
Make maps			
Make markers and signs			
Arrange for first aid			
Arrange for trash disposal			
Arrange for recycling			
Arrange for boat and other transport			
FINAL WEEK			
Make banner			
Assemble materials			
Mow weeds			
Make cleanup schedule			
Set up registration area			
Final publicity			
AFTERWARD			
Post event publicity			
Write Thank-you letters			
Hold review			

[adapted from Cole and Pauley, 1993; Kentucky Division of Water (a)]

STORM DRAIN STENCILING PROJECT

GRADES: 4-A*
SUBJECT: Art, Science, Social Studies
SKILLS: Applying, drawing, communicating, media, observing, mapping, service-learning, small group work, writing
DURATION: Several class periods to plan and carry out
SETTING: Outdoors
KERA ACADEMIC EXPECTATIONS: 1.3, 1.11, 1.13, 2.2, 2.3, 3.6, 4.2, 5.1, 5.3, 6.1, 6.2, 6.3

OBJECTIVE: To alert community to the hazards of dumping waste down storm drains.

METHOD: Distribute flyers and stencil storm drain warning signs.

MATERIALS NEEDED PER GROUP:

- Paper
- Art supplies
- Wire brushes
- Stencils
- Cardboard shields cut from boxes (to contain paint spray on windy days)
- Road spray paint OR
- Road Paint
- Rollers
- Paint pans

PROCEDURE:

- Review the section on Urban Runoff.
- Select an area to stencil warning signs near storm drains on school property or community roads.
- Get permission to stencil from the department that maintains the storm drains: road department, school officials, etc.
- Select a date and rain date for stenciling.
- Stencils can be made, bought from distributors, or borrowed from local environmental groups. (Contact Kentucky Waterways Alliance or THE EARTH MOBILE for more information)
- Walk the selected area and make a map of all the storm drains found.
- Divide class into several groups and assign each group a section of the area selected.
- Use art supplies to design flyers alerting community to the hazards of dumping waste down storm drains and informing them of the stenciling project.
- Secure media coverage for stenciling date.
- Distribute flyers to residents where storm drains will be painted before or on the day of stenciling.
- At the storm drain, brush loose dirt from site with wire brush.
- Arrange stencil near the drain and, if using spray paint, arrange cardboard shields around stencil to prevent paint from blowing on cars, people, etc.

- Spray stencil lightly from about a height of 12 inches from the stencil. Repeat if necessary. A heavy coat may blur the letters (practice on cardboard first).

EVALUATION:
This activity helps to protect local streams and drinking water by discouraging the dumping of oil, paint, etc., down storm drains.

- Was any evidence of dumping seen?
- What was the reaction of the residents to the project?

EXTENSIONS:
Trace the path of drainage to nearby waterways.

- Are the waterways upstream or downstream from the community's water supply?
- If upstream, what would be the effect on the community's water supply if waste was dumped down the storm drains?
- If downstream, what other communities would be affected by the waste?

* For Grades K-3, identify storm drains and types of pollution found in them.

(Activity designed by Cathy L. Neeley)

CREATING BUFFER ZONES

GRADES: 4-A*
SUBJECT: Geography, Horticulture, Science
SKILLS: Analyzing, applying, classifying, problem solving, researching, service-learning, small group work, visualizing
DURATION: Several class periods, may be added to each year
SETTING: Outdoors - suitable for use in outdoor classrooms
KERA ACADEMIC EXPECTATIONS: 1.1, 1.2, 1.3, 1.10, 2.3, 2.19, 4.2, 5.1, 5.2, 5.3, 5.4, 5.5, 6.1, 6.2, 6.3

OBJECTIVE:
To reduce surface runoff and prevent nonpoint source pollution from entering waterways.

METHOD:
Use plants native to specific Kentucky regions to create buffer zones next to sinkholes, wetlands, waterways, etc.

MATERIALS NEEDED:

- Graph paper
- Pencils
- Ruler
- Worksheet - Physiographic Map of Kentucky
- Worksheet - Characteristics of the Physiographic Regions of Kentucky
- Kentucky native plants
- Garden tools - type depends on what is being planted

PROCEDURE:

- Decide on a site such as a stream, lake, pond, wetland, sinkhole, etc.
- Get permission from landowner.
- Consult with biologists from Fish and Wildlife, soil scientists from Natural Resources and Conservation (County Soil Conservation) Office, and other **public service representatives** on each step of the activity. These representatives may also have reimbursement funds available.
- Analyze site for specific features such as:
  available land area that can be used as buffer zone
  existing native plant communities and wildlife habitats
  land use surrounding the site, such as garden, residential area, crop field, park, parking lot
  potential nonpoint source pollution sources
  placement of underground utilities, power lines, roads, etc.
  drainage patterns
  erosion problems
  soil type and pH
- Consider options and prepare a sketch of site on graph paper
- Determine what plant communities are native to the physiographic region of the site location using Worksheet - Physiographic Regions of Kentucky and Worksheet - Characteristics of the Physiographic Regions of Kentucky.
- Several different plant communities may be found in one region - select specific one(s) that would be native to the site.

- Add a landscape plan to the site sketch including:
  where trees, shrubs, ground covers, and flowering plants will be planted
  repair of eroded areas
  preservation of existing native plant communities and wildlife habitats
- Determine what specific plants will be used according to the plant community(ies) selected - considering:
  the use or replacement of existing vegetation
  the attraction of wildlife - butterflies, birds, etc.
  avoidance of invasive and non-native species
  diversity of plant types - trees, shrubs, ground covers, wildflowers, grasses, etc.
  ultimate plant height
  water and sunlight needs
- Buy the plants from reputable nurseries specializing in **cultivated** Kentucky native plants (not plants that have been collected in the wild).
- Optional management:
  connect rain gutters to cisterns or large plastic barrels, use the collected rainwater for watering
  compost cuttings and vegetable food waste as an alternative to commercial fertilizer
  prune trees by thinning, **not** by topping
  install permeable paving for walkways and parking areas to reduce the amount of surface runoff

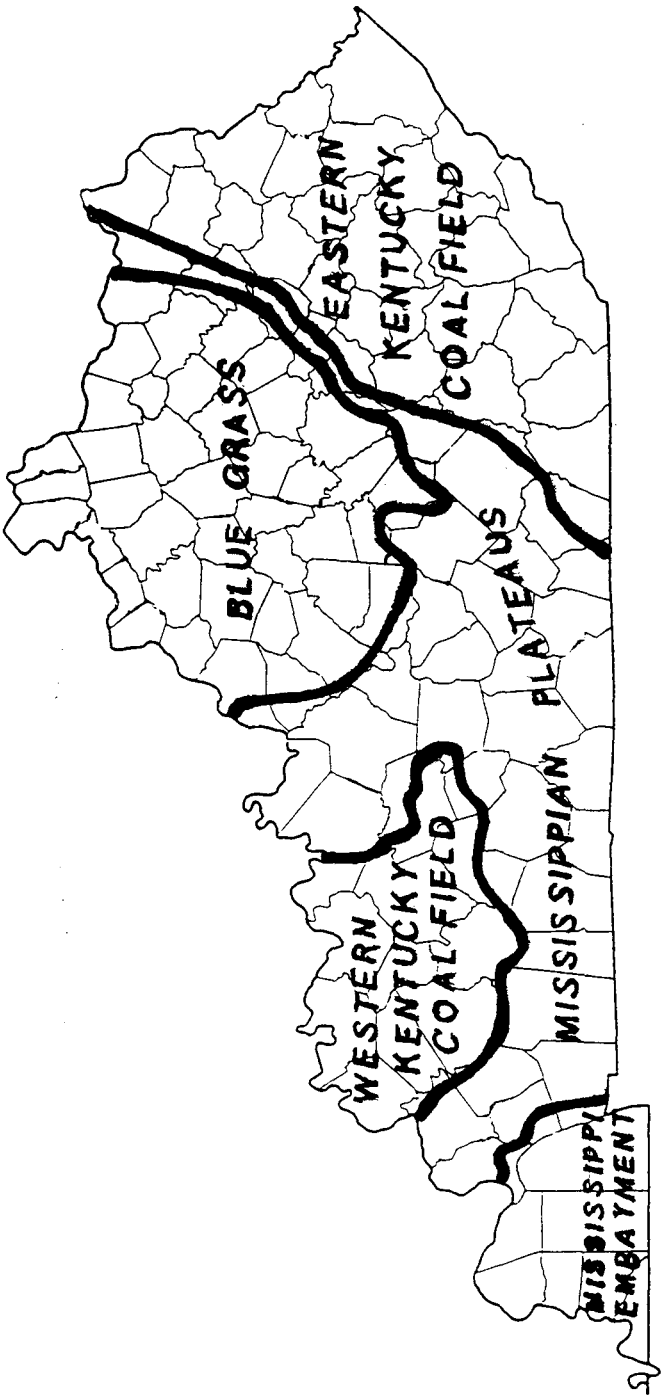
EVALUATION:
This activity assists teachers, homeowners, and civic organizations to reduce nonpoint source pollution by using native plants to create buffer zones next to sinkholes, wetlands and riparian areas.

EXTENSION:
Recreate Kentucky's plant communities in residential and community landscaping, and outdoor classrooms.

* Grades K-3 can assist in planting, some planning.

(adapted from University of Florida)

WORKSHEET - PHYSIOGRAPHIC MAP OF KENTUCKY



WORKSHEET - CHARACTERISTICS OF THE PHYSIOGRAPHIC REGIONS OF KENTUCKY

General overview of the physiographic regions:

EASTERN COAL FIELDS - CUMBERLAND PLATEAU AND MOUNTAINS
landscape - steep valley walls and narrow, sinuous valleys

rocks - shale and sandstone; sandstone forms cliffs that cap ridges

vegetation - rich mixed mesophytic forests of white bass wood, yellow buckeye, white and, northern red oaks, shagbark hickory, white ash, beech, sugar maple, black walnut, and tulip poplar trees
hundreds of species of shrubs, flowering herbs, ferns and mosses

THE KNOBS REGION:
landscape - knobs interspersed with valleys of streams and plains

rocks - siltstone, black shale, sandstone; knobs are dome shaped hills with erosion resistant sandstone caprock overlying easily eroded shale and siltstone

vegetation - oak-hickory forests with white, chestnut, black, post, scarlet, southern red, chinquapin, shumard, shingle or blackjack, and northern red oaks; pignut, mockernut, sweet pignut, bitternut, and shagbark hickories; also red maple, black gum, beech, sugar maple, white ash, black walnut, hackberry, and elm trees
eastern hemlock forests with understory of rhododendron
oak-pine and pine forests with pitch, shortleaf, white and Virginia pines; chestnut, white, and scarlet oak trees; understory of mountain laurel and blueberries

THE BLUEGRASS REGION:
landscape - gently rolling lowland

rocks - limestone and shale

vegetation - open savanna-woodlands of blue ash; bur, chinquapin, and schumard oaks; and shell bark hickory trees
understory of cane, wild rye and other grasses, and legumes on rolling uplands
closed canopy oak-hickory forest on slopes and ravines

MISSISSIPPI PLATEAU - PENNYROYAL REGION:
landscape - broad valleys of karst topography characterized by sinkholes, caves and sinking streams

rocks - limestone and shale

vegetation - tall grass prairie or grassland "barrens" with little bluestem, Indian grass, big bluestem, broomsedges, mints, legumes, milkweeds, and sunflowers
oak-hickory forests on uplands, mixed forests in gorges
rare glades (rock-outcrop ecosystems) with scattered shrubs, eastern red cedar trees and "winter annual plants"

WESTERN COALFIELDS - SHAWNEE HILLS REGION:
landscape - hilly uplands of low to moderately high relief divided by wide, poorly drained and often swampy valleys

rocks - sandstone

vegetation - water tupelo and bald cypress trees in flooded areas
pin, cherry bark, and overcup oaks; sweet gum, green ash, and ironwood trees in seasonally flooded areas
also beech, white oak, red maple, swamp oak, willow, river birch, sycamore trees, and flood tolerant shrubs such as buttonbush

MISSISSIPPIAN EMBAYMENT - JACKSON PURCHASE REGION:
landscape - low hills and flat land cut by shallow streams flowing into the Mississippi River, wetlands, bottom lands, and swamps, remnants of barrens

rocks - sand, gravel, silt, loess, and clay

vegetation - oak-hickory forests on uplands, mixed forests on loess bluffs, tall grass prairie on barrens

Throughout Kentucky:
Old fields/abandoned farmland -
broomsedge and little bluestem grasses, annual and perennial herbs, non-native "weeds"
eastern red cedar, redbud, black locust, white ash, tulip poplar, and black cherry trees
sumacs, blackberries, and hawthorn shrubs

Open wetlands -
cattail, grasses, rushes, and sedges
willow, alder, red maple, silver maple, and green ash trees
button bush shrub

(from Taylor, 1995)